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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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JOSEPH R. BAKER JR. ESQ.
GRAY CARY WARE & FREIDENRICH LLP
4365 EXECUTIVE DRIVE, SUITE 1600
SAN DIEGO CA 92121-2189

EXAMINER	
SODERQUIST, A	
ART UNIT	PAPER NUMBER
1743	13

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Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

PTO-90C (Rev. 2/95)

1- File Copy

Office Action Summary	Application No. 09/409,644	Applicant(s) Lewis et al.
	Examiner Arlen Soderquist	Art Unit 1743

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *Aug 20, 2001*.

2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-97* is/are pending in the application.

4a) Of the above, claim(s) *50-72 and 85-90* is/are withdrawn from consideration.

5) ☐ Claim(s) ______ is/are allowed.

6) ☒ Claim(s) *1-49, 73-84, and 91-97* is/are rejected.

7) ☐ Claim(s) ______ is/are objected to.

8) ☐ Claims ______ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on *Oct 1, 1999* is/are objected to by the Examiner.

11) ☐ The proposed drawing correction filed on ______ is: a) ☐ approved b) ☐ disapproved.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

a) ☐ All b) ☐ Some* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ______.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☒ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

15) ☒ Notice of References Cited (PTO-892)

16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

17) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). *4-6*

18) ☐ Interview Summary (PTO-413) Paper No(s). ______

19) ☐ Notice of Informal Patent Application (PTO-152)

20) ☐ Other:

1. Applicant's election with traverse of Group I in Paper No. 12 is acknowledged. The traversal is on the ground(s) that the methods of Groups II and III are practiced with the subject matter of Group I. This is not found persuasive because the product or apparatus of Group could be used in other methods such as an antistatic agent or as an electrode(s) for performing electrolysis of a solution. Relative to the distinction between Groups II and III there is a question of what is entailed in detecting a microorganism as opposed to detecting an analyte. Presumably there is a difference or applicant would not have presented a claim to detecting a microorganism. Thus by presenting a separate claim applicant clearly separates the two groups.

The requirement is still deemed proper and is therefore made FINAL.

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the wand and associated detection equipment or the structure of the various types of sensors must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 73-76 and 83 rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The complexity of detecting a microorganism has not been demonstrated in any manner in the instant specification. Thus there is no guidance in what is required to actually detect a microorganism. For example, how many sensors does it take or what sensor compositions are required to detect a microorganism. Additionally most microorganisms are not alone and the ability to distinguish one type would certainly include detection of a plurality of compounds in a background of compounds that would vary. Thus there is not an expectation that a microorganism can be detected. Furthermore applicant has not shown that the sensors are capable of distinguishing between different types of microorganisms. Thus applicant has not

shown that they are in possession of a functional device for the intended purpose or that they can overcome the difficulties associated with detecting a microorganism in a background of other compounds that would be expected to constantly vary. If applicant needs to employ other steps or apparatus to isolate and prepare the microorganisms for detection, the instant specification does not provide any basis for combining the respective apparatus needed to detect a microorganism.

5. Claims 1-49, 73-84 and 91-97 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In each of the independent claims, it is not clear what the scope of or structural relationship between the "regions of a conductive organic material and a conductive material compositionally different than the conductive organic material" encompasses. For examination purposes the limitation will be treated as met by a layer of the conductive organic material and the electrodes that are used to supply the power to the conductive organic material. This is because these two conductors have defined regions which appear to be within the claim language used. In claims 1, 91 and 96, it is not clear if the material itself is capable of independently functioning as a sensor or if additional elements are required to allow the material to function as a sensor. The only sensors clearly described in the specification have an electrode pair, an electrical power source and a measuring device that allow them to function as a sensor. Examiner cannot see any claims that include all three of these elements in addition to the sensor material. In claims 8, 13, 30 and 35 it is not clear which response, first or second, is intended. Additionally it is not clear how the response further limits the device since it appears to be an inherent property of all materials. In claims 10, 20-21, 32 42-43 "the conductive material" does not have proper antecedent basis. In claims 12 and 34, "the resistance" does not have proper antecedent basis in at least one of the claims from which they depend. These claims appear to not further limit the claims because they covers all possible resistances and temperatures which is the same scope as the parent claim. In claims 14 and 35, "the electrical impedance" does not have proper antecedent basis. These claims appear to not further limit the claim because it covers all possible impedances, frequencies and temperatures which is the same scope as the parent claim.

Claims 16 and 38 suffer the same problem. In claims 24-25 and 47-48, it is not clear how the method of fabrication further limits the device. In claim 82, it is not clear how the detector can be optimized. Claim 83 appears to fail to further limit the structure of the device. In claim 84 it is not clear if the array of sensors "further comprises" a sensor of the type listed or if the claim is trying to redefine the conductive and conductive organic material required by claim 77.

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless --
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1, 3-17, 20-21, 24-39, 42-43, 45-49, 73-83 and 91-93 are rejected under 35 U.S.C. 102(b) as being anticipated by Lewis (US 5,571,401) or Freund (*Proc. Natl. Acad. Sci. USA* **1995**). In the patent Lewis teaches sensor arrays for detecting analytes. The sensor arrays are a combination of regions of a conductive organic material (see Table 1) and regions of a compositionally different conductive material (the electrodes). Column 1 teaches the use of detection software to distinguish between the analytes. Columns 7-8 provide further details. The specific example given uses polypyrrole as the conductive organic material and a metal alloy as the compositionally different conductive material. Table 3 shows the variety of plasticizers used in the sensor array.

The Freund paper has an equivalent sensor array teaching which uses the 14 polymer sensors found in Table 1.

8. Claims 1, 3 and 91-92 are rejected under 35 U.S.C. 102(b) as being anticipated by Miller (US 5,417,100). In the patent Miller teaches a reversible sensor for detecting solvent vapors. The sensor is a combination of regions of a conductive organic material (see column 3 and examples) and regions of a compositionally different conductive material (the electrodes). Columns 4-5 teaches the use of detection software to distinguish the analytes and the presence of an insulator. The preferred conductive polymer is polyaniline in its emeraldine state.

9. Claims 1, 4-10, 13-14, 17, 20-21, 24-32, 35-36, 39, 42-43, 45-49, 73-83 and 91-93 are rejected under 35 U.S.C. 102(b) as being anticipated by Pearce (*Analyst* **1993**). In the Pearce paper an electronic instrument is described that was designed to measure the odor of beers and supplement or even replace existing analysis methods. The instrument consists of an array of up to 12 conducting polymers, each of which has an electrical resistance that has partial sensitivity to the headspace of beer. The signals from the sensor array are then conditioned by suitable interface circuitry and processed using a chemometric or neural classifier (see figures). The results of the application of multivariate statistical techniques are given. The instrument, or electronic nose, is capable of discriminating between various commercial beers and, more significantly, between standard and artificially tainted beers. An industrial version of this instrument was taught as then undergoing trials in a brewery. Table 1 gives the compositions of the polymer sensors which each are a combination of regions of a conductive organic material and regions of a compositionally different conductive material (the electrodes). The sensors use three different monomers for the polymeric organic conducting material.

10. Claims 1, 4-10, 13-14, 17, 20-21, 24-32, 35-36, 39, 42-43, 45-49, 73-83 and 91-93 are rejected under 35 U.S.C. 102(b) as being anticipated by Slater (*Analyst* **1993**). In the Slater paper an electronic instrument is described that is capable of distinguishing between different alcohols. The instrument consists of an array of 5 conducting polymers, each of which has an electrical resistance that has partial sensitivity to the alcohols. The signals from the sensor array are then conditioned by suitable interface circuitry and processed with an appropriate method such as principle component analysis (see figures). The results of the application of multivariate statistical techniques are given. Table 1 gives the compositions of the polymer sensors which each are a combination of regions of a conductive organic material and regions of a compositionally different conductive material (the electrodes). The sensors each use a different type of polypyrrole for the polymeric organic conducting material.

11. Claim 1 is rejected under 35 U.S.C. 102(b) as being clearly anticipated by de Lacy Costello (*J. Mater. Chem.* **1996**). In the paper de Lacy Costello teaches composite organic-inorganic semiconductor sensors for the quantitative detection of target organic vapors.

Composites of tin dioxide (an n-type semiconductor) and derivative of the conducting polymer polypyrrole (a p-type semiconductor) gave reversible changes in electrical resistance at room temperature when exposed to a range of organic vapors. The optimum amount of polymer giving highest sensitivity was found to be 2.5% by mass for the polypyrrole chloride-tin dioxide composite. Composites containing 2.5% polymer by mass, but differing in polymer derivative were fabricated and exposed to low concentrations of ethanol, methanol, acetone, methyl acetate and ethyl acetate. All gave significant and reversible decreases in electrical resistance. Direct comparison with sensors constructed solely of tin dioxide or polypyrrole at room temperature showed the composites to be more sensitive. The gas sensitivity of the composite materials depended on the type of polymer derivative incorporated and the dopant anion associated with the polymer. The composites were simple to fabricate and gave differing response profiles to a range of organic vapors.

12. Claims 1-3 are rejected under 35 U.S.C. 102(b) as being anticipated by Kashiwazaki (JP 63-308807). In the abstracts of the published application Kashiwazaki teaches an electroconductive complex film which comprises a polymer matrix containing dispersed carbon black or graphite, and a supporting electroconductive polymer layer. Electroconductive complex film consists of a base polymer film consisting of a polymer matrix and carbon black and/or graphite powder dispersed in the polymer matrix, and an electroconductive polymer layer on the surface of the base polymer film. The polymer matrix for the base can be made of polyethylene, polypropylene, polybutene, polyamide, polyoxymethylene, polyethyleneterephthalate, nitrocellulose, ethylene-acrylic acid ionomer, polystyrene, polymethylmethacrylate, polyurethane, polyvinylalcohol, polyvinylidene chloride, polycarbonate, polyimide, butyl rubber, silicone rubber or natural rubber. The electroconductive polymer layer is produced by anodic electrolysis in the presence of pyrrole, N-alkylpyrrole, N-arylpyrrole and optionally a monomer such as thiophene, thiazole, oxazole, etc. these materials have excellent electroconductivity and mechanical strength. They are suitable as a material for switches, battery electrodes, semiconductor element, solar battery, etc. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the

claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963). The recitation of a sensor has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

13. Claims 1-3, 91-92 and 94-95 are rejected under 35 U.S.C. 102(b) as being anticipated by Ikezaki (JP 62-257968) or Tamura (JP 63-120733).

In the abstracts of the published application Ikezaki teaches manufacturing a highly electroconductive polymer composition by polymerizing an aniline-based monomer in presence of electroconductive material and a thermoplastic polymer powder. The aniline-based monomer is e.g. aniline, 2-methoxy aniline, triphenyl-amine or others and in present in an amount of 98-40 wt% (preferably, 95 - 70). The electroconductive material is Ni, Cu, Al, Fe, s/s powder, fibre and net, or carbon black, carbon fibre, graphite, etc. in an amount of 1-59 (preferably 2-28) wt%. Polymer powder is polymer or copolymer melting below 200 °C including LDPE, HDPE, LLDPE, PP, EP copolymer, polyamide, polyester, polycarbonate, etc in an amount of 1-59 (preferably 2-28) wt%.

In the abstract of the published application Tamura teaches the manufacture of an electrically conductive composite material. Composites with electrical conductivity $>10^{-6}$ S/cm, containing electron acceptor dopants, are prepared by oxidative polymerization of aniline ($PhNH_2$), derivatives, or salts in solvents containing carbon black. A solution of water 52, 97% H_2SO_4 15, AcOH 52, and $PhNH_2$ 7.79 g was mixed with 0.29 g Ketjenblack EC in an ultrasonic disperser, cooled to 5.8°, and stirred with 6.85 g $(NH_4)_2S_2O_8$ for 1 hour to give a bright green polymer with electrical conductivity of 9.2 S/cm; vs. 3.2 without carbon black. Conductivity was increased to 12.5 S/cm by pretreating the carbon black with H_2O_2.

For these two references a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963). The recitation of a sensor has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

15. Claims 1-49, 73-84 and 91-97 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lewis as applied to claims 1, 3-17, 20-21, 24-39, 42-43, 45-49, 73-83 and 91-93 above, and further in view of de Lacy Costello or Rajeshwar. Lewis does not teach compositions in which the two conductive materials are mixed together to form a single sensing material having the compositionally different conductive material within the conductive organic material.

In the paper de Lacy Costello teaches composite organic-inorganic semiconductor sensors for the quantitative detection of target organic vapors. Composites of tin dioxide (an n-type semiconductor) and derivative of the conducting polymer polypyrrole (a p-type semiconductor) gave reversible changes in electrical resistance at room temperature when exposed to a range of organic vapors. The optimum amount of polymer giving highest sensitivity was found to be 2.5% by mass for the polypyrrole chloride-tin dioxide composite. Composites containing 2.5% polymer by mass, but differing in polymer derivative were fabricated and exposed to low concentrations of ethanol, methanol, acetone, methyl acetate and ethyl acetate. All gave significant and reversible decreases in electrical resistance. Direct comparison with sensors constructed solely of tin dioxide or polypyrrole at room temperature showed the composites to be more sensitive. The gas sensitivity of the composite materials depended on the type of polymer derivative incorporated and the dopant anion associated with the polymer. The composites were simple to fabricate and gave differing response profiles to a range of organic vapors.

In the paper Rajeshwar presents polypyrrole composites containing platinum or carbon black and discusses the synthesis and applications of the material. Modification of the electrochemical properties of polypyrrole with platinum or carbon black is described. These composites exhibited enhanced properties relative to the neat polymer. The use of these materials in new applications involving pollutant remediation/*sensing*, and in supercapacitor devices was demonstrated.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of de Lacy Costello or Rajeshwar relative to the incorporation of conductors such as carbon black, platinum and tin dioxide into the conductive organic polymers used in the sensing arrays of Lewis because of the enhanced properties as taught by both de Lacy Costello and Rajeshwar.

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The additionally cited art relates to composite materials which anticipate at least one claim and sensor arrays. It is noted that the applied Rajeshwar reference also anticipates several of the claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arlen Soderquist whose telephone number is (703) 308-3989. The examiner can normally be reached from about 5:30 AM to about 3:00 PM on Mondays and from about 7:30 AM to about 5:00 PM on Tuesday through Thursday and alternate Fridays.

For communication by fax to the organization where this application or proceeding is assigned, (703) 305-7719 may be used for official, unofficial or draft papers. When using this number a call to alert the examiner would be appreciated. Another number for official papers is (703) 305-3599. The above fax numbers will generally allow the papers to be forwarded to the examiner in a timely manner.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Arlen Soderquist

September 19, 2001

ARLEN SODERQUIST
PRIMARY EXAMINER